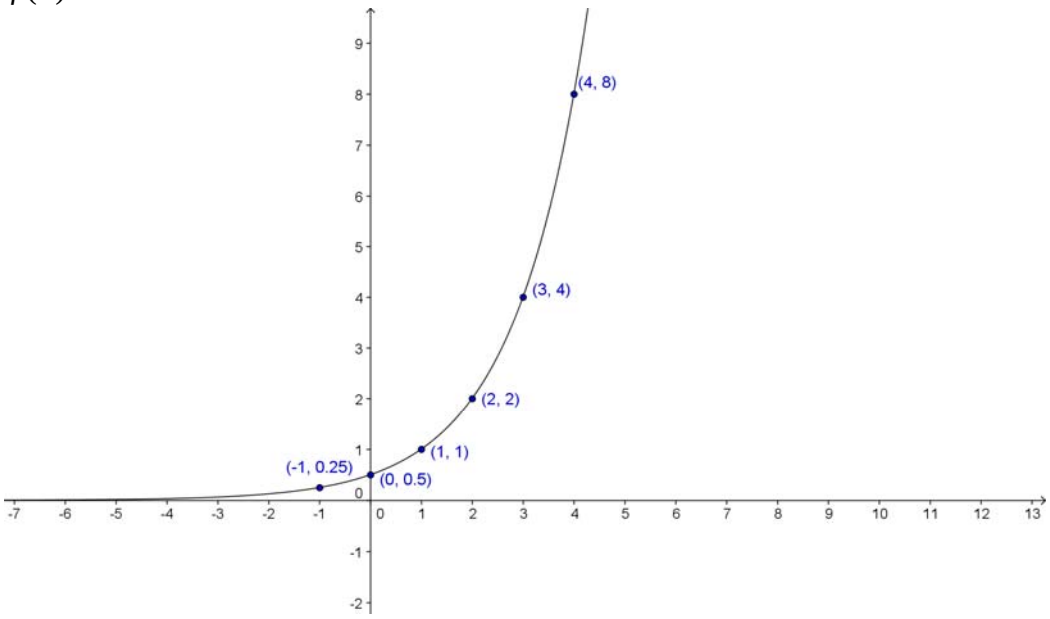
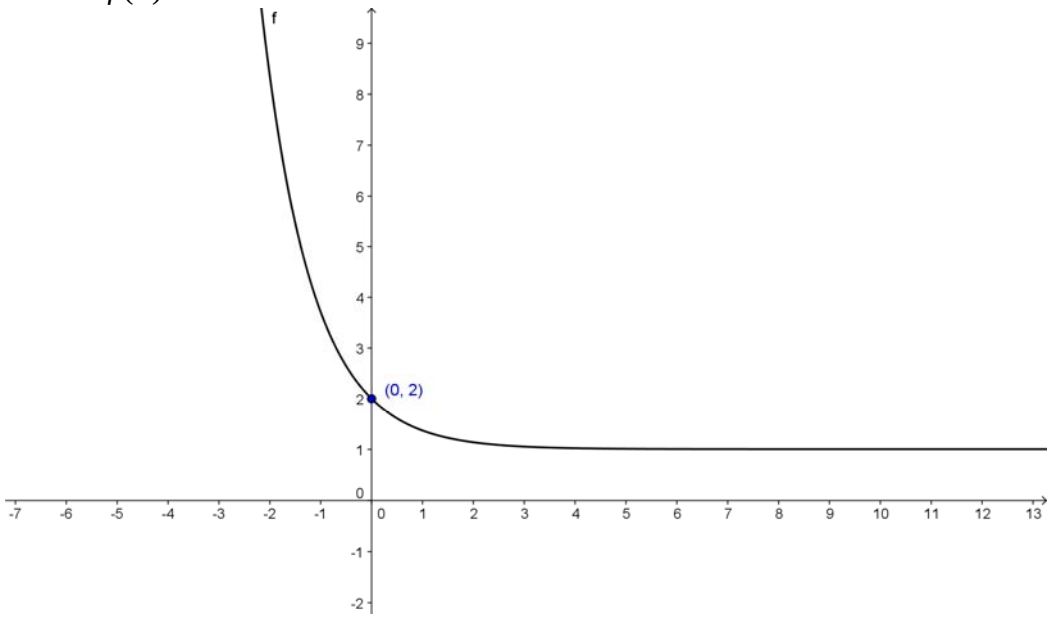
Solutions for practice problems in 3.1 Exponential Functions

1. Sketch the graph:

$f(x) = 2^{x-1}$



$f(x) = e^{-x} + 1$



2. If you invest $2000 at 3% compounded quarterly, how much will you have after ten years? What if you invest it in a continuously compounded account at the same interest rate?

Remember:

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

...where "A" is the ending amount, "P" is the beginning amount (or "principal"), "r" is the interest rate (expressed as a decimal), "n" is the number of compoundings a year, and "t" is the total number of years. In our case:
P=$2000
r=0.03
n=4
t=10

$$A = \$2000\left(1+\frac{0.03}{4}\right)^{4\cdot 10}$$

$$= \$2000\,(1+0.0075)^{40} =$$

$$= \$2000 \cdot 1.0075^{40} = \$2000 \cdot 1.3483$$

$$= \$2696.6$$

The continuous-growth formula is first given in the above form "$A = Pe^{rt}$", using "r" for the growth rate
b

$$A = \$2000 \cdot e^{0.03\cdot 10} = \$2000 \cdot e^{0.3}$$

$$= \$2000 \cdot 1.3499 = \$2699.8$$

3. The population of a small town is 3,000. If the annual growth rate is 2.3%, what will the population be in 15 years?

$$A = P(1+r)^t =$$

$$= 3000\,(1+0.023)^{15}$$

$$= 3000 \cdot 1.023^{15}$$

$$= 4219.45$$

If we wait few days longer we'll have 4220 people in our town.